IOWA HIGHWAY RESEARCH BOARD (IHRB)

Minutes of July 26, 2013

Regular Board Members Present

A. Abu-Hawash	P. Assman
K. Jones	K. Mayberry
S. Okerlund	E. Steffensmeier
D. Schnoebelen	T. Wipf
W. Weiss	
D. Miller	

Alternate Board Members Present

D. Little for M. Kennerly	B. Braun for R. Knoche
D. Sprengeler for R. Younie	M. Parizek for R. Fangmann

Members with No Representation

R. Kieffer

Secretary - M. Dunn

Visitors

Vanessa Goetz	Iowa Department of Transportation
Linda Narigon	Iowa Department of Transportation
Wayne Sunday	Iowa Department of Transportation
Jesus Rodriguez	Iowa Department of Transportation
Dan Sprengeler	Iowa Department of Transportation
Leighton Christiansen	Iowa Department of Transportation
Nicole Fox	Iowa Department of Transportation
Bruce Braun	APWA
Chris Cromwell	FHWA
Danny Waid	Hamilton County
Shauna Hallmark	Iowa State University/In Trans
Brent Phares	Iowa State University/In Trans
Jeramy Ashlock	Iowa State University/In Trans
George Constantinescu	University of Iowa
Brian Keierleber	Buchanan County

The meeting was held at the Iowa Department of Transportation Ames Complex, Materials East/West Conference Room, on Friday, July 26, 2013. The meeting was called to order at 9:00 a.m. by Chairperson Ahmad Abu-Hawash with an initial number of 13 voting members/alternates at the table.

June Minutes
Motion to approve Minutes from the June 28, 2013 meeting

Motion to Approve by 1st E. Steffensmeier 2nd K. Mayberry
Motion carried with 13 Aye, 0 Nay, 0 Abstaining.

*****1 member joined the table. Total voting members 14**

FINAL REPORT, TR-563, "*Effects of Implements of Husbandry (Farm Equipment) on Pavement Performance".*

BACKGROUND
A field study conducted in 1999 by the Iowa Department of Transportation evaluated the effects of several heavy agricultural vehicles on both flexible and rigid pavements. The study concluded that in the spring season, agricultural vehicles with 20% increase in axle weight over the reference 20,000 lb single axle, dual tire configuration semi truck would produce the same effect on flexible pavements as a 40% increase in the fall season. Based on the results, the state of Iowa passed legislation which placed restrictions on the allowable loads of agricultural vehicles. The South Dakota Department of Transportation conducted a similar study in 2001 combining field testing and theoretical modeling. Results from the study recommended that regulations regarding certain types of agricultural vehicles should be changed. For instance, the Terragator models 8103 and 8144 should only be allowed to operate empty on unpaved roads and flexible pavements. Single axle grain carts should only be allowed to operate at the legal load limit on unpaved roads and flexible pavements.

The Minnesota Department of Transportation performed a scoping study in 2001, which investigates the impact of agricultural vehicles on Minnesota's low volume roads and whether these vehicles are responsible for pavement damage across the state. Reviews on several county roads revealed that pavement damage was indeed caused by heavy vehicle loading. However, it was indefinite as to whether the damages were caused solely by agricultural vehicle loading since other types of heavy equipment also travel on the reviewed county sections. This study suggested that the Minnesota statutes should be simplified and revised based on the findings of previous studies. Additionally, the study also recommended that a thorough field study should be conducted at the MnROAD test facility.

OBJECTIVES
The main objectives of this research are to determine pavement responses generated by selected types of agricultural vehicles and to compare them to responses generated by a typical 5-axle semi truck. To accomplish this, a full scale accelerated pavement test was conducted at the MnROAD test facility with resources acquired from the Transportation Pooled Fund Program.

Two flexible pavement sections were constructed and instrumented specifically for this study at the farm loop. One of the sections represents a typical 10-ton road with a 5.5 in. asphalt layer and a 9.0 in. gravel base. The other section represents a 7-ton road with a 3.5 in. asphalt layer with an 8.0 in. gravel base. In addition to that, two existing rigid pavement sections were tested at the low volume loop. One of the rigid pavement sections is doweled and consists of a 7.5 in.

concrete layer with 12 in. class-6 base. The other section is undoweled and consists of a 5.0 in. thick concrete layer with 1.0 in. class-1f base on top of a 6.0 in. class-1c subbase.

The flexible pavement sections were heavily instrumented with strain gauges, earth pressure cells, and linear variable differential transducers (LVDTs) to measure essential pavement responses under heavy agricultural vehicles whereas the rigid pavement sections were instrumented with strain gauges and LVDTs. Testing was scheduled to be conducted in the spring and fall seasons to capture responses when the pavement is deemed to be at its weakest state. On top of that, various agricultural vehicles operate at a higher frequency in the spring and fall seasons. A crucial piece of measurement which was absent in previous studies is the measurement of vehicle traffic wander. Vehicle traffic wander was measured in this study by video recording the vehicle passes as they travel on top of scales installed onto the pavement surface. Also included in this study was the actual tire footprint measurement of the tested vehicles. This measurement was successfully obtained using the Tekscan device.

DISCUSSION

Q. Are manufacturers concerned about heavy loaded vehicles?
A. Manufacturers are providing vehicles for testing and are not happy with the findings. Farmers are also concerned.

Q. Track Systems on grain carts, would this be a benefit?
A. The track system can be a benefit but also adds weight to the vehicle.

Q How can we use the knowledge of damage to educate the industry?
A. Wisconsin DOT has some outreach initiatives currently to educate those in the industry on the impacts of these vehicles to the highway system. There is some potential to do similar things in Iowa.

Motion to Approve by 1st D. Schnoebelen, 2nd P. Assman.
Motion carried with 14 Aye, 0 Nay, 0 Abstaining.

PROPOSAL, "*Mitigation of Sedimentation at Multi-Box Culverts*", Marian Muste, The University of Iowa.

BACKGROUND

These investigators have conducted a preliminary culvert sedimentation analysis applied to four different soils areas in Iowa. In each of these areas, a dozen of two-box culverts were searched for the degree of sedimentation as enabled by aerial images. The sediment deposits were quantified using two representative ratios estimated from the images the stream-to-culvert width ratio, and sediment-covered width to total culvert width ratio. This preliminary analysis results indicate that there are obvious correlations between the sediment deposit extent and stream-to-culvert ratio as well as soil erodibility. Geometry of the variables used to quantify culvert sedimentation Correlations between stream-to-culvert ratio and soil erodibility in various Iowa regions. The preliminary analysis led these investigators to the conclusion that in the areas where the sediment delivery rates are low (~1 ton/acres) the stream-to-culvert width ratio delineating deposition at multi-barrel culverts is lower than for high rates areas (~8 to 24 tons/acres). The preliminary analysis was conducted for about 50 two-box culverts located throughout the state to capture the different characteristics of the Iowa soils.

OBJECTIVES

The overall project objective is to systematically identify the likelihood of culvert sedimentation as a function of stream and culvert geometry along with the soil characteristics of the area drained by the culvert. The conceptualized relationships will be expressed analytically for their use in conjunction with the current culvert design specifications used by IDOT and county engineers. The following specific goals will be integral part of the proposed study:

- Conduct the analysis on aerial photographs on a significant sample of 2- and 3-box Culverts located in various soil areas throughout the state
- Estimate the rates of sedimentation using previous aerial photographs
- Conduct field surveys to accurately quantify sedimentation volumes, the origin of the Materials (core analysis), and additional factors involved in sedimentation
- Develop analytic relationships to capture:
    a. the functional relationship between stream-to-culvert ratios and soil erodibility
    b. the rate of sedimentation for various soil erodibility factors
- Develop matrix for complementing the culvert design process
- Review culvert design specifications and formulate provisions to account for local soil characteristics in the design of culverts

DISCUSSION

Q. Is the drainage area something that will be looked at in this study?
A. Yes, the drainage area will affect the design discharge.

Q. How are Multi-Box culverts different from bridge outlets?
A. A Bridge is an open area and does not block the nature channel. Most bridge problems are a scour issue. A culvert is designed for small streams. When you put a culvert in you create a larger area for the transition which then causes a settlement deposit at the culvert site.

Q. What does the specification look like?
A. The design at this time is based on the flow.

Motion to Approve by 1st W. Weiss, 2nd K. Mayberry.
Motion carried with 14 Aye, 0 Nay, 0 Abstaining.

PROPOSAL, "*Investigation of Field Corrosion Performance and Bond/Development Length of Galvanized Reinforcing Steel",* Brent Phares, ISU/InTrans

BACKGROUND

In the fall of 2013 Buchanan County will be constructing a new demonstration bridge with several novel innovations. Of primary importance to the work proposed here is the fact that all steel (girders and reinforcing bars) in the bridge will be galvanized. Because of vigorous interest on the part of the galvanizing industry, Buchanan County is receiving these materials at no cost which offers a unique opportunity to conduct testing to address several as-of-yet unanswered questions.

OBJECTIVES

The objectives of this work are to: Gather information on the use/acceptance of galvanized reinforcing steel by the national and international engineering community. Install and monitor corrosion monitoring sensors in the yet-to-be-constructed Buchanan County demonstration bridge. Conduct laboratory testing to study bond and development length of galvanized reinforcing bars.

Q. With the short duration of this project what is the corrosion potential to this material?
A. There is zero potential of corrosion. We will monitor the first year then continually be sent the data.

Q. What is the life of a sensor?
A. The life of a sensor is over 10 years, plenty of time to know if any corrosion would affect the structure.

Q. Will you be doing any lab testing on corrosion resistance?
A. We are not; we will be focusing on the structural characteristics.

Q. Will you be testing the area near the joints to see the salt interactions?
A. We will be testing near the bars into the gutter area where the water flows and near the scuppers where water exits the bridge.

Q. Is it Buchanan County's procedure not to apply ice control chemicals to the deck for the first year?
A. No, we apply salt on the decks.

Q. Are you using galvanized rebar in the abutment design?
A. Yes, I need to make sure I keep the galvanized hoop away from the H pile. I might go with fiber bar.

Motion to Approve by 1st W. Weiss, 2nd K. Jones.
Motion carried with 14 Aye, 0 Nay, 0 Abstaining.

NEW BUSINESS

- Hamilton Co. is coming up with a test program for the Low Cost Rural Surface Alternatives: Demonstration Project and requesting additional funding. One of the stabilization procedures will require the use of a reclaimer, which will need to be done by a contractor; Hamilton County does not have that equipment. Due to time constraints, the Board consensus was to have the Operations Research Engineer approve any additional funding necessary if less than $20,000. If the estimate exceeds $20,000 it will be brought back before the board for approval.

- Vanessa led a discussion on two potential research topics that may be addressed later in the year regarding gravel road maintenance and cost-effective optimization of material selection. Direction was given regarding the development of the research scope. RFPs will be developed over the next few weeks for future Board review.

ADJOURN

Motion to Approve by 1st K. Jones, 2nd P. Assman.
Motion carried with 14 Aye, 0 Nay, 0 Abstaining.

The next meeting of the Iowa Highway Research Board will be held Friday, September 27, 2013, in the East/West Materials Conference Room at the Iowa DOT. The meeting will begin promptly at 9 a.m.

Mark J. Dunn

Mark J. Dunn, IHRB Secretary